

US008560428B2

(12) **United States Patent**  
**Lynn et al.**

(10) **Patent No.:** **US 8,560,428 B2**  
(45) **Date of Patent:** **\*Oct. 15, 2013**

(54) **SYSTEM AND METHOD FOR ONLINE TRADING USING AN ELECTRONIC SPREADSHEET**

(75) Inventors: **Brian Lynn**, New York, NY (US);  
**Lawrence Miller**, New York, NY (US)

(73) Assignee: **JPMorgan Chase Bank, N.A.**, New York, NY (US)

(\*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 789 days.

This patent is subject to a terminal disclaimer.

(21) Appl. No.: **12/605,411**

(22) Filed: **Oct. 26, 2009**

(65) **Prior Publication Data**

US 2010/0049668 A1 Feb. 25, 2010

**Related U.S. Application Data**

(63) Continuation of application No. 10/256,598, filed on Sep. 27, 2002, now Pat. No. 7,620,584.

(51) **Int. Cl.**  
**G06Q 40/00** (2012.01)

(52) **U.S. Cl.**  
USPC ..... **705/37**

(58) **Field of Classification Search**  
USPC ..... **705/37**

See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

5,339,392	A	8/1994	Risberg et al.	
5,675,746	A	10/1997	Marshall	
5,861,883	A	1/1999	Cuomo et al.	
5,893,079	A	4/1999	Cwenar	
6,035,287	A	3/2000	Stallaert et al.	
6,064,985	A	5/2000	Anderson	
6,134,535	A *	10/2000	Belzberg .....	705/36 R
6,195,647	B1	2/2001	Martyn et al.	
6,347,307	B1	2/2002	Sandhu et al.	
6,996,535	B1 *	2/2006	Ono et al. ....	705/26.81
7,020,632	B1 *	3/2006	Kohls et al. ....	705/37
2002/0046146	A1	4/2002	Otero et al.	
2002/0091615	A1	7/2002	Salvani	
2003/0101128	A1	5/2003	Abernethy	
2003/0110113	A1 *	6/2003	Martin .....	705/36

\* cited by examiner

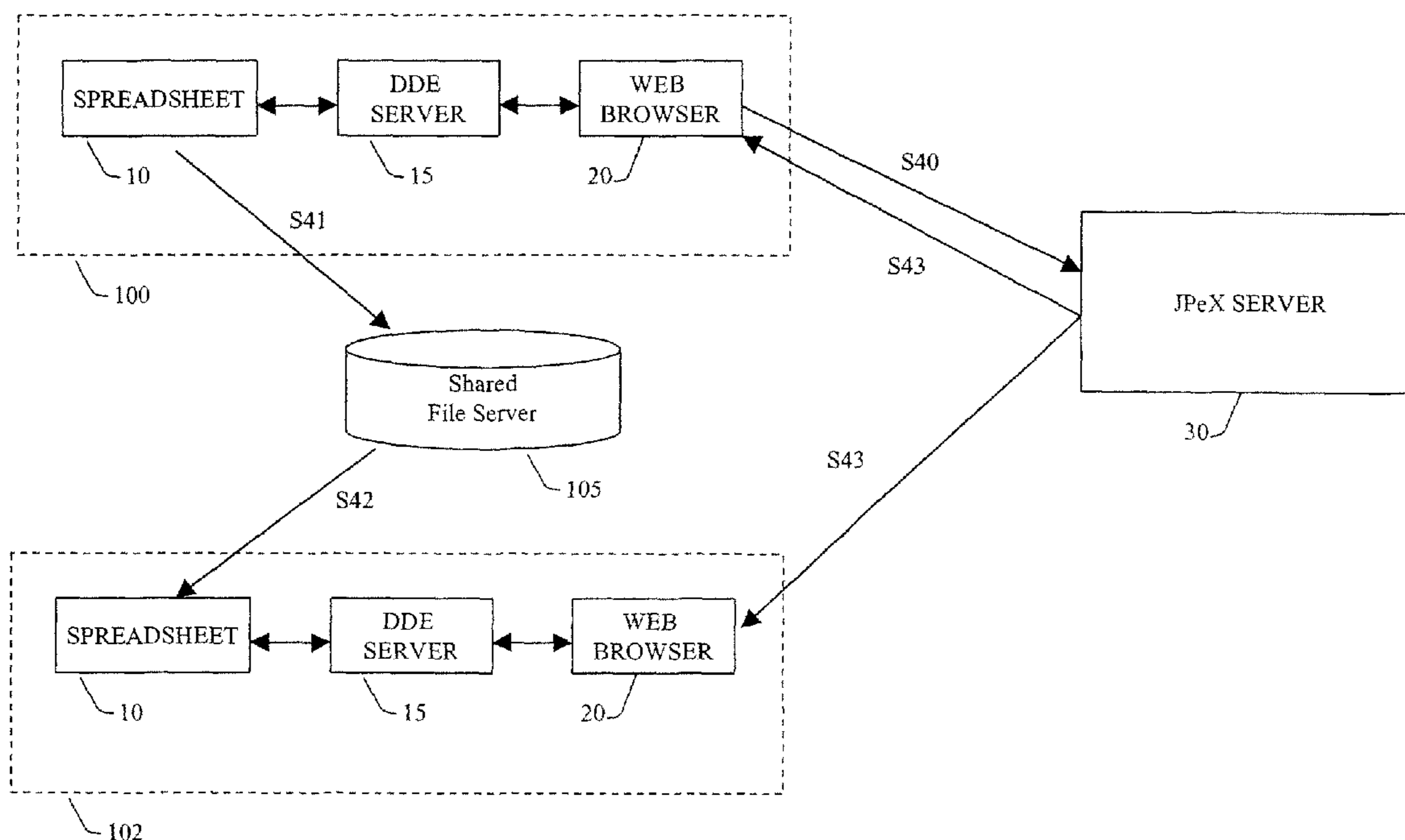
*Primary Examiner* — Jessica Lemieux

(74) *Attorney, Agent, or Firm* — Goodwin Procter LLP

(57) **ABSTRACT**

A system and method for receiving streamed, real time quotes with respect to financial instruments. The system applies a spreadsheet based investment strategy to the real time quotes, generating electronic orders based on the results of the investment strategy analysis and transmitting the orders for real time execution. The system generates a unique order identifier that allows users to actively track the status of orders in real time. This unique order identifiers can be shared with other users so that other trading strategies can be developed to execute upon the successful execution of the order (e.g., hedging).

**10 Claims, 6 Drawing Sheets**



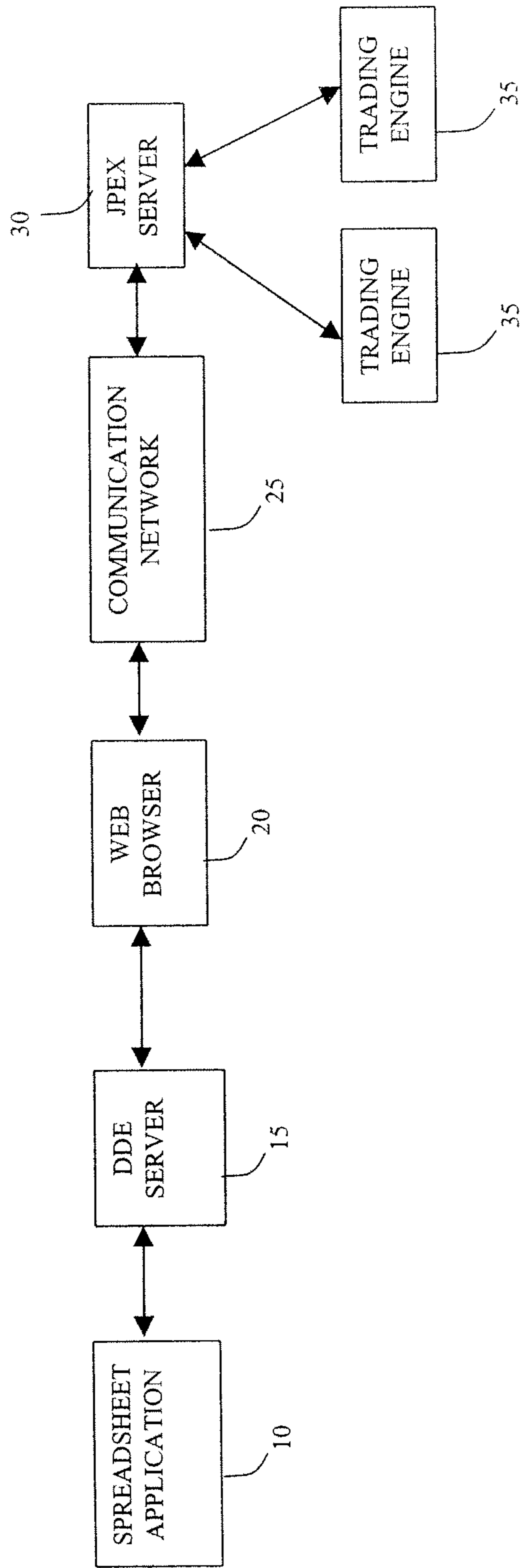


FIGURE 1

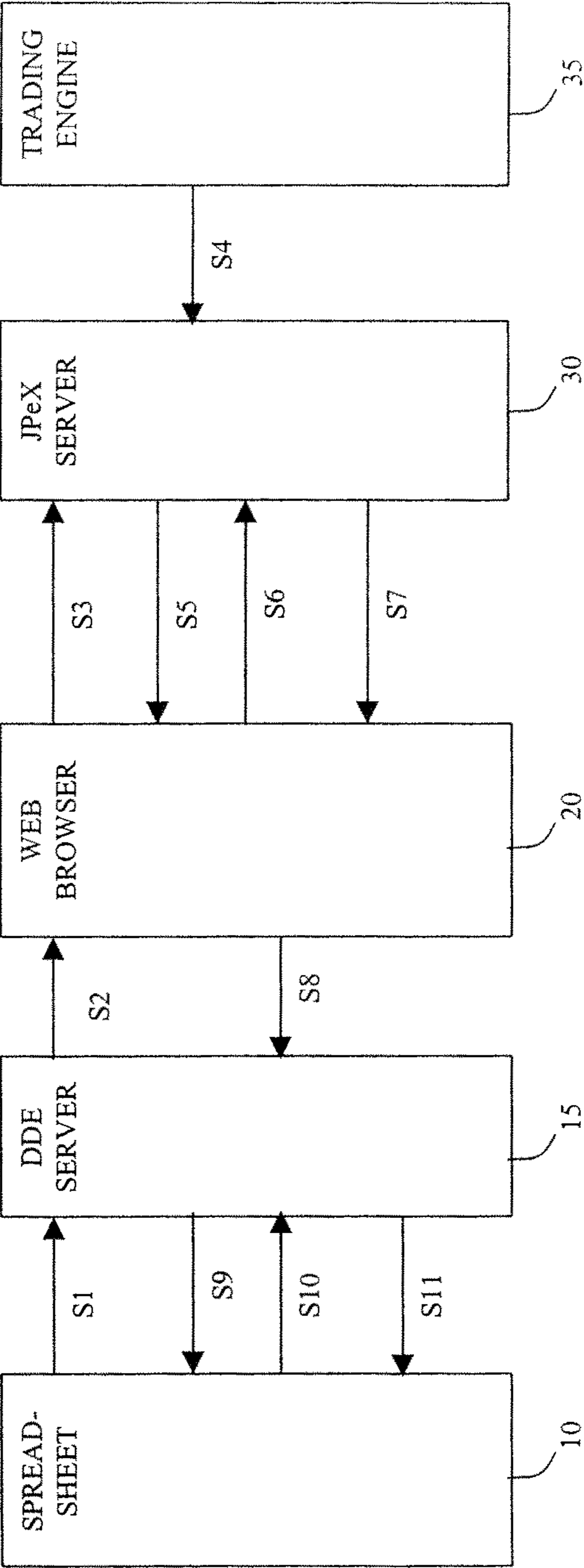


FIGURE 2



Microsoft Excel - JpexLinkOrderDemo.xls

File Edit View Insert Format Tools Data Window JpexLink Help

C18 = ISIN\_DE0001135143

### Portfolio Management Sample

OK Price Feed  
OK Trading Access

160 155 165 170 175 180 185 190

Market Watch

Instrument ID	Description	Bid Qty	Ask Qty	Bid	Ask	Market Pt	Settle Dt
ISIN_DE0001141281	OBL 128 3.75 Aug03	25,000,000	25,000,000	100.316	100.358	OPEN	28-Jul-02
ISIN_IT0001305434	BTP 3.25 Feb04	25,000,000	25,000,000	99.515	99.555	OPEN	28-Jul-02
ISIN_IT0001376141	BTP 3.75 Sep02	25,000,000	25,000,000	100.007	100.037	OPEN	29-Jul-02
ISIN_IT0001423844	BTP 4.5 Jan03	25,000,000	25,000,000	100.496	100.526	OPEN	29-Jul-02
ISIN_IT0001305434	BTP 3.25 Feb04	25,000,000	25,000,000	99.515	99.555	OPEN	28-Jul-02
ISIN_IT0001305434	BTP 3.25 Feb04	25,000,000	25,000,000	99.515	99.555	OPEN	29-Jul-02
ISIN_DE0001141281	OBL 128 3.75 Aug03	25,000,000	25,000,000	100.316	100.358	OPEN	28-Jul-02
ISIN_DE0001351143	BLND 6.25 Jan30	5,000,000	5,000,000	116.280	116.440	OPEN	29-Jul-02
ISIN_DE0001351143	BLND 6.25 Jan30	5,000,000	5,000,000	116.280	116.440	OPEN	29-Jul-02
ISIN_DE0001351143	BLND 6.25 Jan30	5,000,000	5,000,000	116.280	116.440	OPEN	29-Jul-02
ISIN_DE0001351143	BLND 6.25 Jan30	5,000,000	5,000,000	116.280	116.440	OPEN	29-Jul-02
ISIN_IT0000364325	BTP 11.5 Mar03	15,000,000	15,000,000	104.414	104.454	OPEN	28-Jul-02

JpexRangeOrderEntry / FunctionOrderEntry / Excel Trading EN

Ready

150

200

195

FIGURE 3



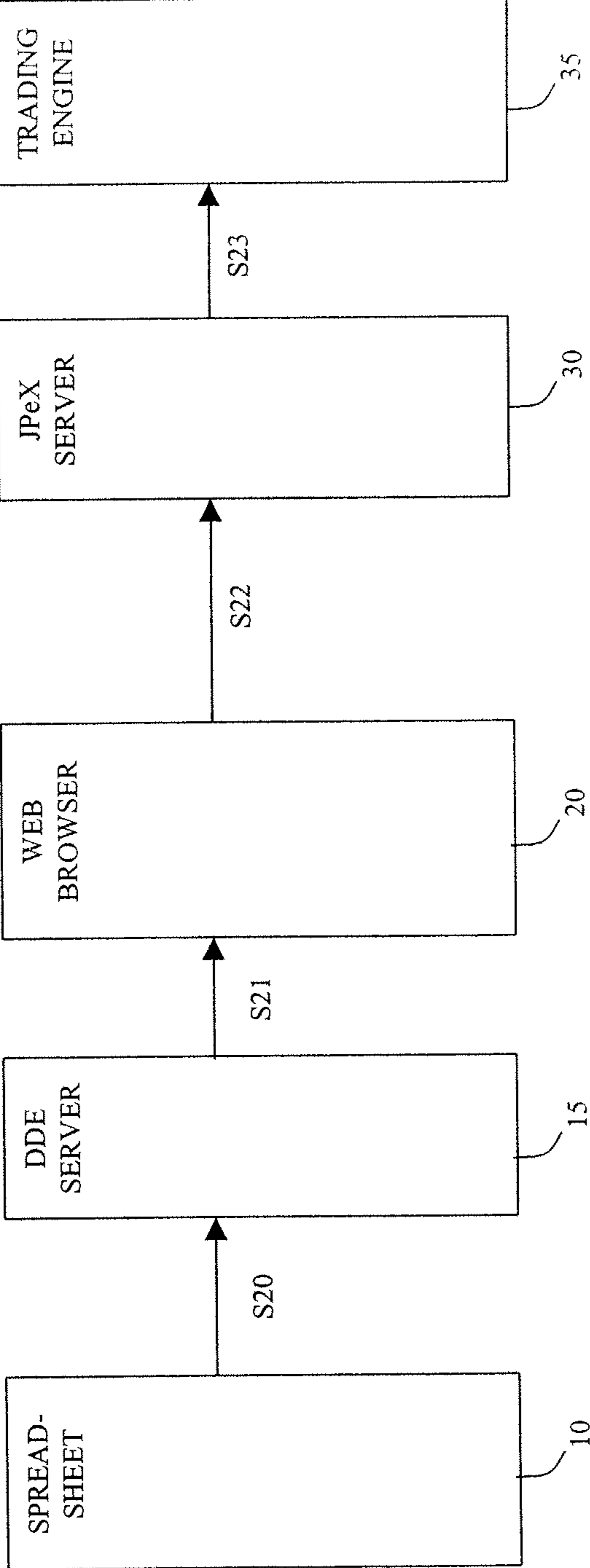


FIGURE 4

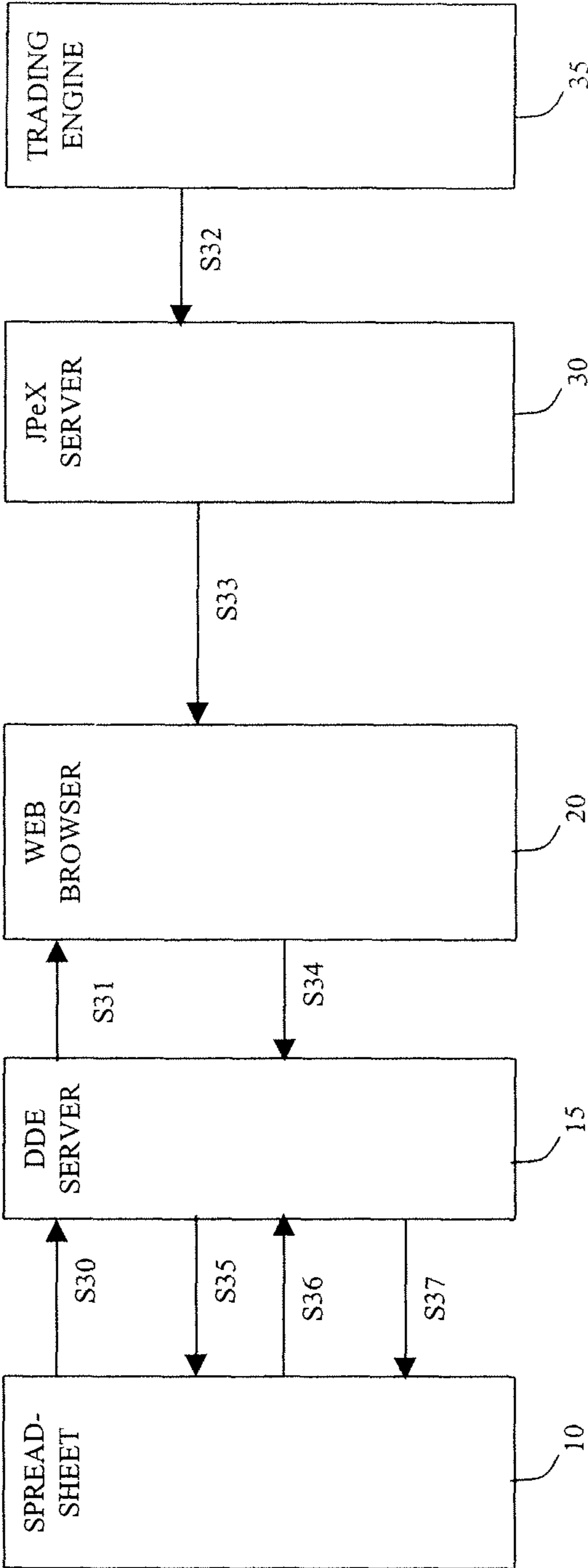


FIGURE 5

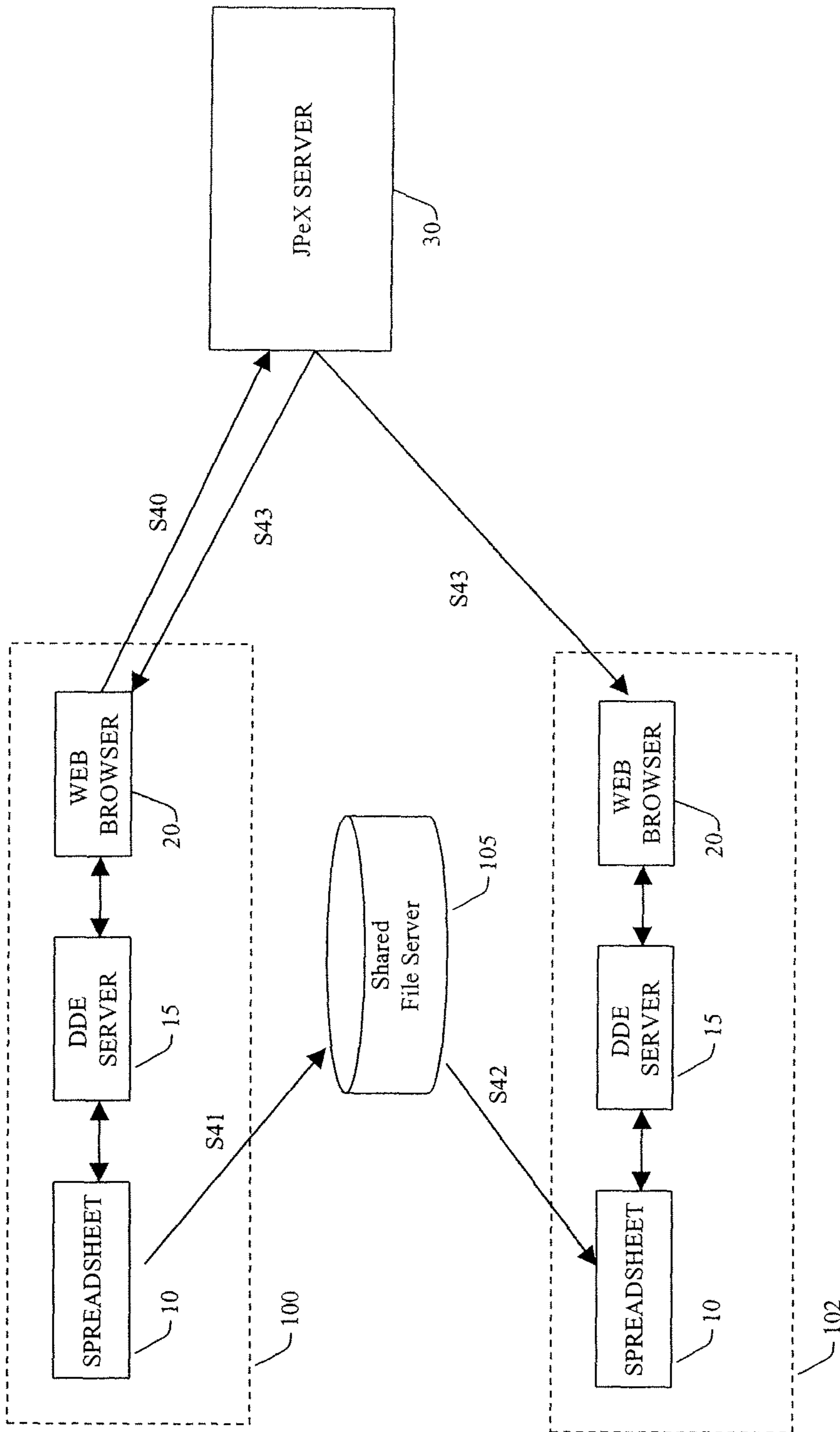


FIGURE 6



1

## SYSTEM AND METHOD FOR ONLINE TRADING USING AN ELECTRONIC SPREADSHEET

This application is a continuation of U.S. patent applica-  
tion Ser. No. 10/256,598 filed on Sep. 27, 2002.

### FIELD OF THE INVENTION

The present invention generally relates to systems and  
methods for online trading, and more particularly to systems  
and methods for conducting online trading in Over-The-  
Counter (OTC) instruments using electronic spreadsheets.

### BACKGROUND OF THE INVENTION

Online trading of financial instruments such as equities  
(i.e., stocks) has become increasingly popular. In order to  
facilitate such trading, systems have been developed to pro-  
vide data streams of real time exchange market data such as  
BLOOMBERG™ and REUTERS™. Systems have further  
been developed to accept this exchange data into electronic  
spreadsheets and to provide a link from the spreadsheet to  
exchange trading systems. One such system is known as  
AUTOMATE™ provided by GL™.

One other such trading system is disclosed in U.S. Pat. No.  
6,134,535 to Belzberg. Belzberg discloses an automated trad-  
ing system to launch a trading order to the order entry system  
of a stock exchange for stocks listed on the stock exchange.  
The system monitors real-time data feeds for a list of stocks  
and their prices that are recorded and displayed to a user in a  
spreadsheet format on a personal computer. When the com-  
posite price of the list of stocks conforms to certain predeter-  
mined parameters, the list is transformed into an order, which  
is immediately sent to an exchange order entry system.

One further trading system is shown in U.S. Pat. No. 5,893,  
079 to Cwenar. Cwenar discloses a system where an external  
data interface receives and processes real-time investment  
information from outside sources. The real-time data is pro-  
cessed and stored on a central server. Multiple users have  
access to the data through a spreadsheet interface. The system  
can be used to effect trades and monitor proposed trades for  
compliance with laws, rules, and preferences. A group of  
securities can be combined into "baskets". Baskets can also  
be a single fund or group of funds combined for purposes of  
transactions.

### SUMMARY OF THE INVENTION

The present invention is a system and method for receiving  
streamed, real time investment quotes, applying a spreadsheet  
based investment strategy to the real time quotes, generating  
electronic orders based on the results of the investment strat-  
egy analysis and transmitting the orders for real time execu-  
tion.

In one embodiment of the present invention, the live real  
time quotes are for Over The Counter (OTC) investments, and  
in an alternative embodiment, the real time quotes are  
Exchange Traded (ET) instruments. These real time quotes  
are preferably provided in a secure session though the pub-  
licly accessible Internet. The real time quotes are received by  
remotely located user workstations (e.g., personal comput-  
ers) through a standard web browser and a customized.  
Dynamic Data Exchange (DDE) interface into an Excel®  
spreadsheet. Although the present invention has been devel-  
oped using Excel®, other comparable spreadsheet applica-  
tions can be used, such as Lotus 123®. The spreadsheet

2

program contains predefined logic representing an invest-  
ment strategy that is applied to the received real time quotes.  
Of particular note is that the present invention is able to  
employ an investment strategy that encompasses several  
instruments (e.g., bonds, futures or options).

After the investment strategy logic has processed the real  
time quotes (in real time) and if the logic indicates that one or  
more instruments should be bought or sold, an order is auto-  
matically generated. This single order can contain instruc-  
tions to buy or sell a plurality of instruments. In a preferred  
embodiment, the automatically generated order is confirmed  
by the operator of the workstation, or if desired, the order can  
be submitted automatically if it satisfies rules previously  
established by the user. The order is then electronically trans-  
mitted, in a secure session over the public Internet to a dealer  
that executes the order in real time.

An order identifier is automatically assigned when an order  
is submitted by a spreadsheet. This order identifier is recorded  
both in the spreadsheet and in the dealer's trade execution  
system. The dealer's execution system then provides real-  
time updates using this order identifier. Thenceforth, the  
execution status of the order is available in real time to the  
sender of the order as well as to other parties as authorized by  
the sender. This feature of the present invention is particularly  
attractive for developing and executing hedging strategies.  
For example, a second workstation can be monitoring for  
executed orders and can generate hedging orders based upon  
the execution of an original order.

The present invention can instantly evaluate trading strat-  
egies, positions, or Profit and Loss (P/L) based on live,  
executable prices. It automatically executes trades based on  
the previously spreadsheet calculated portfolio allocations,  
hedging strategies, funding requirements, etc. The positions  
contained in the spreadsheet are immediately updated as  
orders are executed. Multiple orders, either OTC (such as  
bond or OTC equity warrant orders) or ET (such as future or  
ET option orders), can be confirmed at once when submitted  
from the spreadsheet. The present invention further supports  
Futures and Options order modification and cancellation.

### BRIEF DESCRIPTION OF THE DRAWINGS

For the purposes of illustrating the present invention, there  
is shown in the drawings a form which is presently preferred,  
it being understood however, that the invention is not limited  
to the precise form shown by the drawing in which:

FIG. 1 illustrates the system of the present invention;

FIG. 2 illustrates the steps for obtaining real time price  
quotes;

FIG. 3 shows a user interface screen illustrating a spread-  
sheet sheet populated by the present invention;

FIG. 4 depicts the steps for submitting an order;

FIG. 5 illustrates the steps for obtaining the status of an  
order; and

FIG. 6 illustrates the system for two traders to obtain order  
status.

### DETAILED DESCRIPTION OF THE INVENTION

The system of the present invention is illustrated in FIG. 1.  
As previously described, the system of the present invention  
is a real-time link between a spreadsheet 10 and a server 30  
that both feeds the spreadsheet 10 with a real time data feed as  
well as accepts trade execution orders from the spreadsheet.  
In a preferred embodiment, the spreadsheet application is the  
EXCEL™ product from MICROSOFT™, but as appreciated  
by those skilled in the art, any robust electronic spreadsheet



application can be used in the system of the present invention. In the preferred embodiment, the spreadsheet **10** is executing on a personal computer (not shown) preferably running Windows NT™ or another suitable operating system. The standard spreadsheet application **10** is supplemented with “add-in” programming to provide the user interfaces, simplify certain operations in the spreadsheet **10** and to support the functionality described herein (e.g., order submission).

The spreadsheet application **10** is coupled to a Dynamic Data Exchange (DDE) server **15**. DDE **15** is an interprocess communication (IPC) system built into most personal computer operating systems. In DDE terminology; the “server” **15** is a piece of software running on a personal computer that serves the DDE requests generated by the DDE client (the spreadsheet **10**, e.g., Excel). Alternatively, DDE server **15** is known as a DDE adapter **15**. DDE **15** enables two running applications to share the same data. In the present invention, DDE **15** provides links that make it possible for server **30** to supply real-time prices to spreadsheet **10**, and to allow spreadsheet **10** to submit orders to server **30**. Whenever the real time prices for a particular instrument specified in spreadsheet **10** changes, the price contained in (displayed by) the spreadsheet **10** changes accordingly. As an alternative to the DDE mechanism, Object Linking and Embedding (OLE) tools can be used. OLE enables one to create objects with one application and then link or embed them in a second application. Embedded objects retain their original format and links to the application that created them.

The DDE **15** is coupled to the workstation’s Internet web browser **20**. In the preferred embodiment, the web browser is INTERNET EXPLORER™ from MICROSOFT™. Similar to the add-in for the spreadsheet **10**, the system of the present invention further has a signed Java applet which operates in conjunction with the web browser **20** to provide the functionality described herein. The web browser **20** provides connectivity, though the communication network **25** to server **30**. In the preferred embodiment, the communication network **25** is the Internet, but a private network or a dial up connection could be used. Such alternatives are not preferable to the Internet, though, given the ubiquity of the Internet. Web browser **20** communicates with the server **30** using a combination of streaming HTTPS data (for price and order updates) and synchronous HTTPS requests (for subscriptions and order submission).

Server **30** is the element of the present invention that maintains all of the real time financial instrument data and provides the interface for the execution of order submission. In the embodiment of the present invention involving non-exchange traded financial instruments (such as bonds or OTC equity warrants), the data maintained in server **30** is gathered from non-publicly available sources. Specifically, since the financial instruments are not exchange traded, the pricing of the instrument is made via quotes. In the preferred embodiment, this data is supplied from automated price generation systems controlled by traders for the OTC instruments. For ET instruments, the prices for the instruments are obtained from exchange feeds or market data vendor feeds (e.g. Bloomberg). Server **30** is coupled to various trading engines **35** which serve to actually execute the orders received from the customers through the spreadsheet **10** and the server **30**. The trading engines operate in the various markets in which the financial instruments are traded. In the preferred embodiment, OTC orders are executed automatically by execution engines **35** based on trader-supplied parameters, as known by those skilled in the art. ET orders are preferably routed to the trading desks of the operators of the system of the present invention or to external exchanges for execution. Based on the

architecture shown, orders would be routed through server **30** and routed to the external exchanges. Alternately, the data feed can be routed directly from the user to the external vendor. The manner in which the data feed is routed is dependent upon the system architecture and the way the exchange licenses market data distribution.

FIG. **2** illustrates the interaction of the various components and the steps for obtaining real time price quotes. As previously described, the system of the present invention allows the user to use it familiar spreadsheet application **10** to define cell formulas that reference various attributes of a financial instrument. For example, the instrument can be described in a sheet of the spreadsheet application **10** in terms of its bid and ask prices and sizes, its trading status, and other real-time information, as well as reference data such as maturity date. As those skilled in the art are familiar with the types and formats of programming available in electronic spreadsheet applications **10**, no further discussion is necessary with respect to the routine establishment of a sheet in such a spreadsheet application **10**. In the preferred embodiment, the user of the system programs one or more sheets in the spreadsheet application **10** to reflect his/her trading strategy.

As described in FIG. **2**, the spreadsheet **10** will be automatically, continuously, and instantaneously updated to reflect any changes in the data related to any instrument defined in the spreadsheet **10**. This automatic and continuous updating is accomplished through the DDE server **15**. Values for specific attributes related to an instrument can be used in the present invention as any traditional spreadsheet value could be used. Such values can be entered into formulas, formatted using standard spreadsheet formatting rules (including dates and times), etc. The system of the present invention automatically loads and subscribes to the quotes (the data related to the financial instrument) when the spreadsheet **10** sheet is first loaded, assuming that you are set up to see the corresponding instrument.

Prices and statuses from server **30** can also be used to update conditional formats in spreadsheet **10**. This feature of the present invention allows the user to highlight changes that the user desires to be tracked closely. For example, a cell could cause to change color when a bid or ask price approaches or passes a target, assisting the user in monitoring and executing the user’s predefined trading strategies with less effort.

Prior to the acquisition of real time data, the user loads his/her trading strategy sheet into spreadsheet **10**. This sheet identifies the financial instruments in which the user is interested. The instruments are identified by their industry standard codes such as ISIN (for International Securities Identification Number) or CUSIP (for Committee on Uniform Securities Identification Procedures), using a symbol such as ISIN\_XXXXXXXXXXXX, where XXXXXXXXXXXX is the 12 character ISIN code for the instrument

In step **S1**, the spreadsheet **10** contacts the DDE server **15** and subscribes to a DDE topic and several DDE items in order to obtain the data related to the instrument(s) contained in the user’s sheet in the spreadsheet **10**. As known to those skilled in the art, a topic is the first part (usually a broader category) and item is a narrower piece of information. DDE **15** is relatively flexible about how one uses the constructs of topics and items. In a preferred embodiment of the present invention, topics are used to identify instruments and orders, and items are used to identify fields within these. As appreciated, different market data vendors and system designers can construct their data structures differently. Using Excel, the full DDE syntax in Excel is “=Service!Topic!Item.” In the preferred embodiment this will result in a syntax of



## 5

“=Service|InstrumentID|FieldName”. By subscribing, the spreadsheet **10** is requesting that the DDE **15** set up links with server **30** to retrieve all of the relevant data for the instruments specified in the subscription. In step **S2**, the DDE **15** passes the subscription onto the Java applet in the web browser **20**. An example of a protocol for the transmission of the subscription from the DDE **15** to the Java applet **20** for a single instrument with an ISIN code of ISIN\_DE0001135135 is as follows:

SUBSCRIBE|ACTIVATE|ISIN\_DE0001135135|\*

In step **S3**, the Java applet in the web browser **20** transmits a query to the server **30** with respect to the instrument(s) specified in the subscription from the DDE **15**. Note that the communication network **25** (FIG. **1**) has been omitted in the present Figure, merely for reasons of simplicity. Again, in the preferred embodiment, the communication network **25** is the Internet. In response to the query from the web browser **20**, in step **S5**, server **30** returns reference data related to the specified instrument(s) to the Java applet in the web browser **20**. The reference data is obtained by the server **30** from the real time markets through trading engines **35** (only one shown). The reference data is obtained in order to determine a correlation between the descriptions of instruments as used by spreadsheet **10** and by the real time markets. For example, the symbol used by an Excel spreadsheet **10** is not the same as that used by the real-time market data infrastructure. One advantage of providing this abstraction of the real time market symbols this is that the server **30** can obtain prices for the same instrument from different sources in response to a single query by a user using a single common description of the instrument.

Once the correlation for the symbols for the instrument is established, the trading engines **35** continuously updates the instrument data to the server **30** (step **S4**). In the ET embodiment, the real time data representing the financial instruments can be received from an external vendor for this data. In a preferred embodiment, the data from trading engines or the external ET vendor is cached by server **30** (or by a separate caching system coupled to server **30**).

In step **S6**, the Java applet in the web browser **20** transmits a subscription to server **30** with respect to the real-time data related to the specified instrument(s). In response to this subscription, the server **30** returns real time updates for the instrument(s) to the web browser **20** (step **S7**). Most importantly, the real time update data for the instrument includes real time updates with respect to the price of the instrument(s). If the instrument is a stock, though, important update data could include the quantity of the stock traded for the day. Trade volume is data related the stock that changes constantly and must be updated and monitored in real time in certain trading strategies.

In step **S8** web browser **20** passes the updated instrument data onto DDE server **20**. Below is an example of the format of such an update.

---

M|u|ISIN\_DE0001135135|DESCRIPTION=BUND 5.375  
Jan10|MARKET\_PHASE=System  
Unavailable|CCY=EUR|BID\_QTY=10,000,000|BID=103.41|  
ASK=103.51|ASK\_QTY=10,000,000|BID\_YLD=4.817|  
ASK\_YLD=4.802|YLD\_CHG\_DAY=-5.933|ASSET\_SWP=-  
15|ASSET\_SWP\_CHG=1|TIME=12:08:32|CODE=ISIN  
DE0001135135|MATURITY\_DT=2010/01/04|SETTLE\_DT=  
2002/07/05|COUNTRY=DE|ISSUE\_DT=1999/10/12|  
INSTR\_GROUP=EGB  
German|COUPON=5.375|PRICE\_CHG\_DAY=0.373|PVBP=  
6.316|SUPPORT\_CODE=|BID\_PRICE\_FLAG=Firm|

## 6

-continued

---

ASK\_PRICE\_FLAG=Firm|BID\_STATUS=Active|ASK\_  
STATUS=Active|  
BID\_TICK=0|ASK\_TICK=0|SYS\_SOURCE\_LOC=LON

---

Steps **S4**, **S7** and **S8** continuously feed new pricing data for the instruments in the subscription from the trading engines **35** to the server **35** to the web browser **20** to the DDE server **15**. This automatic feed continues until the subscription is cancelled. No further requests from the DDE **15** or web browser **20** are required. In step **S9**, the price update is passed onto the spreadsheet application **10** from the DDE **15**. The spreadsheet **10** uses this data to update the sheet that initiated the entire process. Steps **S10** and **S11** illustrate the continuous process by which the spreadsheet **10** is updated with new real time pricing data from the DDE server **15**. DDE **15** notifies spreadsheet **10** when update data is available. Spreadsheet **10** pulls the update data from DDE **15** when it is ready to process the update data. Spreadsheet **10** then waits for another notification from DDE **15** that updated data is available. Once it has established a subscription with respect to one or more instruments, it is not necessary for spreadsheet **10** to actively poll DDE **15** for data updates.

FIG. **3** illustrates a sample sheet **150** in spreadsheet application **10** that has been populated by the system of by the present invention in accordance with the process described in connection with FIG. **2**. Although the screen illustrated in FIG. **3** depicts eight different columns, as appreciated by those skilled in the art, the user can choose to include any combination of the fields that constitute the reference data that defines the instruments. Typically, there are 50-150 fields that describe any particular financial instrument. Column **155** contains the industry standard codes for the financial instruments that the user has included as part of sheet **150**. Again, these financial instruments are instruments that the user has chosen to keep track of, and include as part of the user's trading strategy. Column **160** contains the description of the instruments of column **155**. Columns **165**, **170**, **175** and **180** respectively contain the Bid and Ask quantities as well as the Bid and Ask prices. Column **185** indicates whether or not the market for the particular instrument is presently open. Finally, column **190** contains a proposed settlement date for a trade involving any particular financial instrument.

As appreciated by those skilled in the art, sheet **150** can contain formulas and other programming that analyzes the data for the financial instruments. In a simple example, the Bid **165** and Ask **170** columns can be conditionally formatted to indicate tic up/down in these prices by shading the changing values in different colors (e.g., red and green). As further described below, other extensive programming can be applied to the cells of the sheet **150** to implement the user's trading strategy. For example, in a simple trading strategy, the user can program spreadsheet **10** to implement a trading strategy that recognizes when the price of an instrument reaches a predetermined threshold, that the instrument should be sold. As appreciated by those skilled in the art, this is the simplest of trading strategies. Modern electronic spreadsheets **10** are capable of implementing incredibly complex trading strategies analyzing the data for hundreds or even thousands of financial instruments in real time. Tabs **195** and **200** indicate other sheets for implementing the user's other trading strategies.

FIG. **4** illustrated the submission flow for orders in accordance with the present invention. Orders are the instructions from the user to either buy or sell one or more financial instruments. There are several methods according to the



present invention by which orders can be prepared in spreadsheet **10** prior to their transmission and execution. The method of the present invention allows the user to automate routine order entry tasks, such as those involved with re-balancing a portfolio or hedging a book.

There are two basic ways in which the system of the present invention generates orders, one manual and one automatic. In each of the methods, the order would contain the basic information required to execute the order such as a description of the financial instrument (e.g., the ISIN number), the quantity, the price, the settlement date, etc. IN the manual mode, the user has an active page on spreadsheet **10** that contains all of the potential orders. One of the columns associated with each order is an "Enabled" column that indicates whether the user wants a particular order executed or not. The spreadsheet has a button **200** (See FIG. **3**) that the user activates to submit the orders. Only the orders with a positive indication in the "Enabled" column will processed for submission to the trading engines **35** (see FIG. **1**). In the preferred embodiment, the system requires active confirmation for all orders that are submitted manually.

In the automatic mode, spreadsheet **10** is programmed to automatically generate and submit orders if certain conditions occur. In a very simple example, the user can specify that an order be executed if the price of a particular financial instrument attains a certain value. As appreciated by those skilled in the art, spreadsheet **10** can be programmed to evaluate hundreds of variables in executing complex trading strategies in order to determine if an order should be automatically submitted. As with the manual mode, the automatically submitted orders contains all of the information required to execute the order (e.g., price, quantity . . . )

In a preferred embodiment, the spreadsheet generates an order ID when the order is submitted. This order ID can be written into a cell of the spreadsheet. The order ID is used to obtain order status updates for specific orders. The order ID allows precise automated monitoring of order status, which in turn allows trading strategies to be developed that depend upon the execution status of a previous order. For example, a limit order can be submitted to an exchange, which is not executed immediately. When the limit order is executed, another order can be automatically submitted, possibly on another market, e.g., an OTC bond order. The order ID allows individual orders to be tracked and allowing various trading strategies to be implemented including automated trading.

In step **S20**, spreadsheet **10** has generated an order that contains instructions with respect to one or more financial instruments. As part of the actual order, spreadsheet **10** includes a unique order identifier (e.g., BRIANLYNNTRADER2002070212190000). This unique order identifier is assigned by the spreadsheet **10** add-in, which updates the sheet from which the order originated to create a subscription to keep track of the status of the execution of the order (see below).

DDE server **15** receives the order from spreadsheet **10** and transmits the order to the web browser in step **S21**. The order submitted by DDE **15** retains the unique order identifier assigned by spreadsheet **10**. The following is an example of the protocol of the order transmitted by DDE **15**:

---

```
JPEX_ORDER|BRIANLYNNTRADER2002070212190000|
ISIN_DE0001141281|ORDER_QTY=10000|
BUY_SELL=FALSE|ORDER_TYPE=IMMEDIATE|
PRICE_CHECK_TYPE=At Market|
BATCH=BRIANLYNNTRADER2002070212183600RANGE
```

---

In step **S22**, web browser **20** transmits the order (still including the unique order identifier) to the server **30**. One

again, the communication network **25** (FIG. **1**) has been omitted from the present Figure merely for purposes of clarity. Upon receipt of the order from web browser **20**, server **30** saves original order that contains the unique order identifier. As explained below, this is a significant feature of the present invention that allows tracking of the status of the order by one or more parties. In processing the original order, server **30** takes the information contained in the order and generates executable orders in the format required by trading engines **35**. This is the reason that server **30** must save the original order containing the unique order identifier. Otherwise, the original order identifier generated by spreadsheet **10** would be lost to server **30** and thus unusable for updating the order status in linked spreadsheets **10**.

In step **S23**, sever **30** sends the formatted order (or multiple orders if several financial instruments are involved) to trading engines **35**. The orders sent to trading engines **35** by server **30** contain new unique server order identifier that is generated by server **30** and inserted into the order(s). Server **30** maintains a database in which it correlates the unique order identifier generated by spreadsheet **10** with the unique server order identifier that it has generated. This correlation is used by server **30** to enable tracking by the system of the status of the orders submitted by the spreadsheet **10** as illustrated in FIG. **5**.

FIG. **5** illustrates the method of the present invention for tracking the status of an order. The present invention provides the capability to monitor the status of orders in real time. The DDE references to various order fields, including order ID, status, executed quantity and price, update time, etc can be entered on a sheet in spreadsheet **10** to view the real time status of the orders. These values are also provided in standard spreadsheet **10** data types, and can be used to drive formulas. For example, a status sheet could use the executed quantity in a formula to drive a position-keeping sheet. In a preferred embodiment of the present invention, when an order is submitted, an entry is automatically created for the submitted order on a status sheet known as a blotter. Once the order is submitted, the system creates the status entry on the blotter sheet and the user is able to switch over to that blotter to view the status of all of its orders.

In step **S30** of FIG. **5**, spreadsheet **10** submits a subscription **10** DDE **15** with respect to the order for which status is desired. In the subscription, the topic is set equal to the unique spreadsheet identifier as previously described with respect to FIG. **4**. An example of the format for such a subscription is: BRIANLYNNTRADER2002070212. DDE **15** takes this subscription from spreadsheet **10** and in step **S31** transmits the subscription to the add-in in the web browser. The subscription from DDE **15** to web browser **20** includes the unique spreadsheet identifier associated with the order. A sample protocol for the subscription is:

```
SUBSCRIBE|ACTIVATE|JPEX_ORDER.DDE.BRIANLY-
NNTRADER2002070212190000|*
```

In the preferred embodiment, server **30** is programmed to automatically provide status updates for all active orders after the order has been submitted to server **30**. Accordingly, there is no need for web browser **15** to send any further messages to server **30** to set up the subscription for the status of active orders. In step **S32**, the trading engines **35**, pursuant to the automatic updating of the preferred embodiment, provides server **30** with an update of all of the fields associated with the order. The order status from the trading engines only includes the server **30** assigned identifier, as the trading engines **35** are unaware of the spreadsheet identifier. Upon receipt of the update from the trading engines **35**, the server **30** consults its



database and retrieves the spreadsheet unique order identifier and appends that identifier to the order status.

In step S33, server 30 transmits the order status to web browser 20 (in a preferred embodiment through the Internet, not shown). The order status from server 30 preferably contains both the server identifier for the order as well as the spreadsheet identifier. One reason for the inclusion of the server identifier is that in one embodiment of the present invention it is possible for spreadsheet 10 to keep track of orders by the server identifier in addition to the internally assigned spreadsheet identifier. This allows the spreadsheet to track orders not originally submitted from a spreadsheet, e.g. orders submitted directly into web browser 20. Due to the automatic updating of order status in the preferred embodiment, steps S32 and S33 continually feed the web browser 10 with the updates of the statuses of the active orders.

In step S34, the add-in to the web browser 20 transmits the received order status to DDE server 15. The order status preferably contains the unique spreadsheet identifier and optionally contains the server identifier or other identifier that allows the spreadsheet to uniquely identify the order. A sample protocol for the order status is as follows:

---

```
M|u|JPEX_ORDER.DDE.TRADER12002072417301701|ORDER_
ID=10,997|Trade ID=7,409|RFQ_ID=|ORDER_STATUS=Executed|
INSTR_NAME=OBL 128 3.75
Aug03|BUY_SELL=Sell|CCY=EUR|EXEC_QTY=10,000|MARKUP=
---|Exec Spd=---|SETTLE_AMT=0|SETTLE_DT=2002/07/29|EXCH_
CODE=|REJECTION_MSG=|ORDER_QTY=10,000|PRICE_
CHECK_TYPE=At Market|VALIDITY=Immediate|PRICE=100.306|
Order Spd=---|QUOTED_PRICE=---|Quoted Spd=---|LOCAL_CODE=
|CREATION_DT=2002/07/24|CREATION_TIME=17:30:17|UPDATE_
DT=2002/07/24|UPDATE_TIME=17:30:20|INSTR_ALT_ID=
DE0001141281|USER_ID=trader1|NOTES=|REM_QTY=0|FILLS=
1|COUNTRY=DE|CLIENT_FIRM=BL Company|EE_ORDER_ID=
133773|EE Trade ID=118518|EE_QUOTE_ID=|DESCRIPTION=
OBL 128 3.75 Aug03|CODE=DE0001141281|INSTR_GROUP=EGB
German|LIMIT_POS=|EXEC_PRICE=100.306|STOP_PRICE=---
|BE_CREATION_DT=2002/07/24|BE_CREATION_TIME=17:30:17|
BE_UPDATE_TIME=17:30:20|BE_ACCOUNT=GSAMXLON|
ACCOUNT_NAME=account 1|CTI=|ORIGIN=|FEE=|ALLOC_
PCT=|ACCOUNT_TYPE=|EXCH_ORDER_ID=133773|CREATOR_
ID=trader1|LAST_MOD_ID=trader1|ORIG_OWNER_ID=trader1|
BE_USER_ID=|AltOrderID=TRADER12002072417301701|
AltBatchID=TRADER12002072417301700|RANGE|
AltOrderSource=Excel Manual|INSTR_ID=ISIN_DE0001141281|
DDE_ORDER_ID=TRADER12002072417301701
```

---

In step S35, DDE server 15 notifies spreadsheet 10 that an update to the status of the order is available. In step S36, spreadsheet 10 requests the update. And in step S37, DDE server 15 provides the update to spreadsheet 10. Spreadsheet 10 then uses the updated data to refresh the data corresponding to the order contained on one or more sheet within spreadsheet 10.

FIG. 6 illustrates the system for two traders to obtain order status. In particular, this embodiment is useful for executing a hedging strategy. FIG. 6 illustrates the process by which trader 102 can monitor trader 101's complex trading strategies using spreadsheet 10. In this embodiment, each trader 100 and 102 has identical systems, namely a spreadsheet application 10 with an appropriate add-in as described above, a DDE server 15 and a web browser 10 (with appropriate applet). In a hedging scenario, trader 100 is performing trades against which trader 102 is hedging.

In this scenario, trader 100 creates a series of automatically maintained limit orders in it spreadsheet 10 and saves a copy of his spreadsheet-based orders. Trader 102 then loads a view of these orders and automatically sets up hedging orders in a

second session in his spreadsheet application 10. The hedging orders of trader 102 are based on real-time price and order status feeds relative to trader 100's orders. As previously described, all trading strategies according to the present invention are entirely user-definable using the rules of the spreadsheet application 10.

In step S40, trader 100 submits his orders to server 30 as previously described with respect to FIG. 4. In step S41 trader 100 saves his spreadsheet that contains the unique spreadsheet order identifiers to a shared file server 105. In step S42, trader 102 retrieves the saved spreadsheet that contains trader 100's live orders. In step S43, each of traders 100 and 102 begins receiving the order status updates for the live orders as previously described with respect to FIG. 5. Again, trader 102 is able to retrieve the status of the order of trader 100 because trader 2 is using the unique spreadsheet order identifier assigned to trader 100's orders. Server 30 is able to provide trader 102 with the status of trader 100's orders as trader 102 is using the unique order identifiers assigned to trader 100's orders. In executing a hedging strategy, the spreadsheet 10 of trader 102 will monitor the status of the orders of trader 100, and when specific conditions occur (e.g., trader 100's orders are executed), trader 102's spreadsheet 10 will automatically generate its own hedging orders.

Although the present invention has been described in relation to particular embodiments thereof, many other variations and other uses will be apparent to those skilled in the art. It is preferred, therefore, that the present invention be limited not by the specific disclosure herein, but only by the gist and scope of the disclosure.

We claim:

1. A computer-implemented system for generating hedging orders for financial instruments, the system comprising:
  - a shared file server for receiving spreadsheets from at least two trader systems including a first spreadsheet having a first unique order identifier from a first trader system, and a second spreadsheet having a second unique order identifier from a second trader system, each trader system including;
    - an electronic spreadsheet application executed by a processor,
    - a Dynamic Data Exchange (DDE) interface coupled to the electronic spreadsheet application, the electronic spreadsheet application configured to create and transmit orders to the DDE interface with respect to the financial instruments, each order containing the respective unique order identifier; and
    - a financial instrument server coupled to the DDE interface of each trader system, the financial instrument server storing the unique order identifier and generating an executable order for forwarding to a trading engine, the financial instrument server automatically receiving real time update data from the trading engine and transmitting the real time update data to the electronic spreadsheet application through the DDE interface,
 wherein the second trader system submits a status request using the first unique identifier in order to monitor orders of the first trader and upon receiving a predetermined real time update related to the first order, generates the second order having the second unique order identifier using the spreadsheet of the second trader system in order to hedge against the first order.

2. The system of claim 1, wherein each executable order contains a unique server order identifier, the financial instrument server maintaining a database correlating each unique order identifier with the corresponding unique server order identifier, thus correlating the order generated by each elec-



**11**

tronic spreadsheet application with the executable order, wherein the corresponding unique order identifier differs from the unique server order identifier.

3. The system of claim 2, wherein, based on a subscription request, the trading engine automatically provides real time update data related to the financial instrument, including the unique server order identifier, to the financial instrument server, the financial instrument server correlating the unique server order identifier with the corresponding unique order identifier and transmitting the real time update data including the corresponding unique order identifier to the electronic spreadsheet application through the DDE interface.

4. The system according to claim 3, further comprising a web browser coupled between the DDE interface and the financial instrument server, wherein the web browser receives the subscription from the DDE interface, receives the real time data from the financial instrument server, and publishes the real-time data to DDE.

5. The system according to claim 4, further comprising a communication network coupled between the web browser and the financial instrument server.

**12**

6. The system according to claim 5, wherein the communication network is the Internet.

7. The system of claim 1, wherein the financial instruments are exchange traded instruments and prices for the financial instruments are obtained from exchange feeds and market data vendor feeds.

8. The system of claim 1, wherein the financial instruments are non-exchange traded instruments and prices for the financial instruments are obtained from automatic price generation systems.

9. The system of claim 1, wherein the spreadsheet of each trader system is automatically and continuously updated to reflect any changes in data related to financial instruments referenced in the spreadsheet.

10. The system of claim 1, wherein each spreadsheet is programmed to automatically generate and submit orders if certain conditions occur.

\* \* \* \* \*